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ANALYSIS OF PYCNANTHEMUM LANCEOLATUM, AND NOTES ON ITS ETHEREAL OIL.

By Harold C. Barker.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 129.

This analysis was made in the Chemical Laboratory of the Philadelphia College of Pharmacy, at the request of Prof. Henry Trimble, to whom the writer is indebted for many suggestions, as well as a continual supervision of the work. No published analysis of this plant has been found by the writer, but an examination of P. linifolium, a nearly allied species, was made by Dr. Charles Mohr, in the year 1876, the results of which were published in the Proceedings of the American Pharmaceutical Association, Vol. 24, p. 513.

The material used in the present analysis was collected in Delaware County, Pa., during the latter part of July and the earlier part of August, 1893, when the plant was in flower. In collecting, the plants were cut off a few inches above the ground.

The material was allowed to dry without exposure to sunlight or artificial heat, it thereby losing about 60 per cent. of its weight. For analysis, a sample was reduced to fine powder, of which 50 grammes were taken.

The results of the analysis may be tabulated as follows:

			Per Cent.
Moisture,			8·96
Ash,			5·77
Benzol extract:			
Ethereal oil,		1·47	
Substance not volatile at 110°:			
Soluble in hot alcohol,	1·20		
Insoluble in hot alcohol,	·72		
		1·92	
			3·39
Ether extract,			·90
Alcohol extract,			1·45
Aqueous extract:			
Mucilage,		·70	
Glucose,		·37	
Undetermined,		4·60	
			5·67
Alkaline aqueous extract:			
Albuminoids, etc., precipitated by alcohol,		1·26	
Undetermined,		4·47	
			5·73
Acid aqueous extract:			
Pararabin,		·43	
Other organic substance,		·72	
			1·15
Inulin,			·35
Lignin, etc., removed by chlorine water, etc.,			23·95
Cellulose, etc.,			36·09
Loss,			6·59
			100·00

The moisture was estimated by drying at 110°; the amount stated consequently includes a part of the ethereal oil.

The benzol extract was of an olive green color, and on evaporation of the solvent, left a semi-solid residue, having the odor of the ethereal oil. This was first dried at 100°, and weighed; then brought to very nearly constant weight at 110°, the intention being to take the difference between these two weights as the weight of the ethereal oil; but, as the percentage thus found was far lower than the percentage of ethereal oil actually obtained in distilling a quantity from the air-dry herb, it being less than one-fifth as great, the latter was considered more nearly correct, and is the percentage stated in the table.

The residue non-volatile at 110° was treated with hot absolute

alcohol, and the dark green solution filtered while hot. The residue left undissolved consisted mainly of a dark green, rather soft and somewhat elastic substance, soluble in chloroform, resembling caoutchouc; partly, also, of a grayish green substance of different consistency, perhaps difficultly soluble in hot alcohol, as the alcoholic filtrate, on cooling, deposited a little of a substance similar in appearance and possibly identical. Besides this substance, the alcoholic solution, after the evaporation of the larger part of the solvent, deposited a dark green substance, leaving the supernatant fluid almost colorless. The whole of this alcoholic extract was finally dried and weighed.

The ether extract left on evaporation a dark green residue, which was dried and weighed. It was subsequently treated with acidified water, slightly warm, and the filtered liquid tested for alkaloids and glucosides, with negative results. The residue, after the treatment with acidified water, was treated with alcohol, which partly dissolved it, forming a dark green solution, and leaving undissolved a dark green residue.

The alcohol extract left a yellow-brown residue on evaporation. It was treated, after drying and weighing, with cold water, with which it formed a turbid mixture extremely difficult to filter. A small quantity of tolerably clear filtrate, which was acid to litmus, gave the following reactions:

With solution of ferric chloride, and solutions of ferric chloride and ferrous sulphate, mixed, dark brown precipitates, perhaps slightly greenish; no inky coloration.

With potassio-mercuric iodide solution; no precipitate.

The aqueous extract was yellow-brown in color, slightly acid to litmus. Total organic matter was estimated by evaporating one-tenth (25 cc.) to dryness, and weighing; the ash was then estimated, and its weight deducted. This ash was found to contain considerable phosphoric acid. The mucilage was estimated in 25 cc., by precipitation with two volumes of alcohol. After drying and weighing, the ash was estimated and deducted. It amounted to a trifle over 21 per cent. of the entire precipitate.

To 100 cc. was added an excess of lead acetate solution, the precipitate filtered off and washed, the filtrate and washings freed from lead with hydrogen sulphide, and, after driving off the excess of hydrogen sulphide by heating, the fluid was divided into two equal

parts; one of which was made alkaline with potassium hydrate solution, and the glucose estimated with Fehling's solution; the other was acidified with one per cent. of hydrochloric acid, boiled, made alkaline with potassium hydrate solution, and heated with Fehling's solution; it, however, reduced slightly less than the first part.

The alkaline aqueous extract was of a reddish-brown color. To estimate total organic substance extracted, one-tenth (40 cc.) was evaporated to dryness, and weighed; the ash then estimated and deducted. To estimate albuminoids, etc., 40 cc. were acidified with acetic acid, and three volumes of alcohol added. The precipitate was dried and weighed, and its ash estimated and deducted.

The acid aqueous extract was obtained by digestion in the cold with water containing about one per cent. of anhydrous hydrochloric acid. The total organic substance in the extract was estimated in an aliquot part by neutralizing with sodium carbonate, evaporating to dryness and weighing; the ash being then estimated and deducted. To estimate pararabin and calcium oxalate, one-tenth (50 cc.) was neutralized with ammonia water and two to three volumes of alcohol added. The precipitate was dried and weighed; then gently incinerated, and its ash calculated from calcium carbonate to calcium oxalate. The amount of calcium oxalate found was equivalent to 0·38 per cent. of the air-dry herb. The weight of the calcium oxalate was subtracted from the weight of the precipitate, the remainder being taken as the weight of pararabin.

The residue of the plant after the treatment with acid water, and washing, was boiled with water. To one-half of the filtered liquid was added about one per cent. of hydrochloric acid; it was then boiled for from three to four hours, rendered alkaline with potassium hydrate solution, and the sugar estimated with Fehling's solution. The amount found was calculated to starch or inulin; and, as the original solution when tested for starch with iodine gave a negative result, the amount is stated as inulin.

The washed residue from the treatment with boiling water was dried and weighed; then treated with chlorine water, and washed first with water, then with a weak solution of sodium hydrate until the washings were almost colorless, and finally again with water. It was then dried and weighed, the ash estimated in a portion, calculated to the whole amount, and deducted; the amount remaining

being equivalent to the percentage of cellulose, etc., stated in the table.

A portion of the original powdered herb was tested for tannin by extraction with cold water; a brown solution being obtained, which gave brown precipitates with ferric chloride solution, and with a mixture of ferric chloride and ferrous sulphate solutions; and a light brown precipitate with solution of gelatine containing alum, but a similar precipitate was obtained with solution of alum alone.

The residue from the above extraction with cold water was boiled with water, and the solution tested with iodine for starch, which was not detected.

Special tests were also made with some of the original powdered herb, for alkaloids and glucosides, with negative results.

In drawing conclusions from the analysis, the absence of tannin and starch, and the small quantities of inulin and sugar may be noted; also, the failure to find either alkaloids or glucosides, as above stated.

NOTES ON THE ETHEREAL OIL.

The oil was obtained by distilling the material, broken into short lengths, with water, in which it was soaked overnight before distilling. The aqueous portion of the distillates was returned to the still, with the exception of that obtained in the last distillation, which was shaken out with benzol; the separated benzol solution left, on evaporation of the solvent, a small quantity of oil, which was added to the main quantity.

The total amount obtained weighed about 53·47 grammes, which was equivalent to about 1·47 per cent. of the air-dry material.

The following of its properties were ascertained:

Color pure yellow, of medium depth.

Odor considerably resembling that of pennyroyal.

Specific gravity, at 15° C., ·9361.

The boiling points were determined by heating on a sand bath in a test-tube, the thermometer bulb being completely immersed in the oil. The temperature was allowed to rise slowly.

At 150°, boiling commenced, very gently.

At 205°, the ebullition had become rather more brisk, but still very gentle.

Between 210° and 215° it became much stronger.

The temperature finally rose to 216°, but did not then remain

stationary; the oil continued to boil for over an hour, with the temperature varying between 212° and 216°; the heat was then removed. During the heating, the oil became amber-colored.

When a vessel containing a quantity of the oil was immersed in water at a temperature of from 10° to 12°, the oil became clouded and nearly opaque. A quantity of the oil was placed in a test tube, which was then sunk into a mixture of snow and salt. The oil first became cloudy, afterwards, a small quantity of a white substance, separated in small, cottony masses, the liquid becoming again clear. The oil did not increase in viscosity to any noticeable extent. On removing the test tube from the freezing mixture, the cottony masses rapidly disappeared. They were probably due to the presence of a little water dissolved in the oil, especially, as the portion of oil which had been boiled in determining the boiling points, when cooled with snow did not lose its transparency, nor did any substance separate.

The following color reactions, etc., were observed:

One drop of oil with three drops of concentrated sulphuric acid gave a red-brown color, immediately. To one drop of oil dissolved in about 1 cc. of chloroform, two drops of sulphuric acid were added. The acid acquired a red brown color, while the chloroform remained colorless.

One drop of oil with five drops of strong hydrochloric acid gave no color.

One drop of oil with about 1 cc. of alcohol, and one drop of hydrochloric acid, gave no color.

One drop of oil with four to five drops of fuming nitric acid gave a red-brown color.

A fragment of iodine was added to a few drops of oil, which acquired a dark-red brown color, but there was no energetic action.

To five drops of oil, ·05 grm. of picric acid was added. This dissolved readily and completely in the cold, forming a solution having a brownish-yellow color, which changed to yellowish-green.

A portion of the oil was treated in the following manner:

15 cc. of the oil were mixed with 12·5 grammes of sodium hydrate, 40 cc. of absolute alcohol, and 7 cc. of water, in a flask, which was connected with an inverted Liebig's condenser, and the contents heated to boiling on a water-bath for over two hours. To the resulting deep red-brown fluid was added an equal volume of

alcohol, a current of carbon dioxide passed through, and the precipitated sodium carbonate filtered out.

A portion of the alkaline filtrate was mixed with about five volumes of water, the result being a turbid fluid of a reddish-ochre color. This was agitated with ether, which removed the substance causing the turbidity, forming a red-brown solution, which on evaporation, left a red-brown, transparent, soft, resinous residue, having an odor somewhat resembling that of the original oil. This residue slowly hardened, in thin layers forming a varnish-like film.

The alkaline fluid, after having been well shaken out with ether, the operation being repeated several times, was of a brownish-red color, and very nearly clear. It was acidified with dilute sulphuric acid, which caused a yellowish-brown turbidity, the substance to which it was due soon largely coagulating into soft red-brown masses. The whole was shaken with ether, which readily dissolved the red-brown masses, forming a red-brown or brownish-red solution. The acid fluid became clear and nearly colorless. The ethereal solution left, on evaporation, a transparent, resinous substance, at first soft, but slowly hardening, with little or no odor.

UNITED STATES FORESTRY AT THE FAIR.

By Joseph Crawford, Ph.G.

Read at the Pharmaceutical Meeting, December 19, 1893.

Forestry, in the proper sense of the word nowadays, means the study of forest trees in their direct relation to man, and the care, protection and perpetuation of them on their native as well as cultivated grounds.

As Mr. Fernow, of Forestry Association, says, "The forest primeval is our most valuable inheritance.

"It is the ready cash of Nature's bountiful promise for our future. Of all the natural resources reserved for our use *it* is the most directly useful, for in the forest ready to hand without further exertion than the mere harvesting, is the greatest variety of material applicable to the needs of man, the means to satisfy every direct want of life.

"And if left to herself, without interference of man, Nature would keep entire, with few excepted, all localities under forest cover.

"It is only when man interferes that the tendency of Nature is either frustrated or turned to advantage for the objects of man. If

the latter, then we may speak of forest management, and we understand by management the bestowal of care, giving direction and applying economy in the use of natural resources."

And the Columbian Exposition managers very generously erected a building of liberal proportions in which could be displayed, in their many conditions, "The Trees of the World."

It certainly was one of the most unique on the grounds, and it is to be very much regretted that its location in an extreme corner by the Lake and erection so close to other buildings and hidden by the intramural railway, that the beautiful rustic effect was lost, except viewed from the Lake. Built in the form of rectangle, 200 x 500 feet, and surrounded on all four sides by a veranda, supporting the roof of which is a row of columns composed of tree trunks. arranged in threes, each 25 feet high, the bark remaining on. One of these, the central, was from 16–20 inches in diameter and the outside two from 9–12 inches in diameter. These were characteristic trees of different States, Territories and foreign countries, and each specimen properly named, common and scientific terms.

The sides of the building were constructed of slabs with bark removed, and the roof thatched with tan and other barks.

The main entrances were elaborately finished in different kinds of wood, the material and workmanship being contributed by several prominent lumber associations.

Interior was very plain, neither paint nor ornamentation appearing anywhere, unless we except those heterogeneous masses in niches which were the homes of those saucy individuals, the omnivorous and omnipresent English sparrow—Passer domesticus.

Of the trees forming the colonnade we have no record excepting those furnished by Pennsylvania and Minnesota, and these will be described under State exhibits. The following States, Territories and countries represented in this building were: Argentine Republic, Arizona, Australia, Brazil, California, Canada, Connecticut, Colorado, Florida, France, Germany, India, Indiana, Idaho, Japan, Kentucky, Louisiana, Massachusetts, Mexico, Michigan, Minnesota, Missouri, Nebraska, New York, North Carolina, North Dakota, Oregon, Ohio, Paraguay, Pennsylvania, Russia, Siam, Spain, Phillipine Isles and Cuba, Trinidad, Utah, Virginia, Washington, Wisconsin and West Virginia.

This building was always overlooked in a description of the Fair

Buildings, and Transportation given the credit of being the only one that was not of regulation white color. Will pardon all such shortsightedness from its situation and feel sure that had it been in any other location of the grounds much less difficulty and embarrassment would have been experienced in finding it than was the lady's lot, for instance, who was sure the "Lagoon" was in the Liberal Arts Building.

And at same time its pristine grandeur would have shown out nobly towards the Roman and Castilian architecture, so greatly admired by every one, in the other buildings.

But that is not the "pith" of the argument, you say? Well, then, will let you have the "wood" and make what you can out of it. On entering the hall the eye was startled by the vast accumulation of timber representing all stages of growth, as well as of manufacture. Then from gazing on the monster Redwoods of California our eyes fall on the top of the little rustic bower from Connecticut, where we behold the only genuine nutmegs grown in the State, that are worth speaking about. It was very pleasing, indeed, to find this old-time industry revived and good sized and scented specimens swinging aloft in this first temple of World's Forestry.

May we not ask whether they did not utilize some of the motive force of the great Ferris Wheel to assist in turning out some of these quaint necessities (?) of the kitchen?

These, no doubt, assisted those heavy bills of fare in producing indigestion at the Exposition, and venture to say were the direct cause in the Ostrich Farm of Gail Hamilton's discomfiture and her sudden stampede down the Midway, after some Yankee. But even here Ostrich alacrity was no equal for Yankee tact.

Charity begins at home, and Pennsylvania, in order to show her sweet character to sister States and visitors, bestows a Sugar Maple section on the mundasylvatic group in the centre of the building.

Around the Lake front colonnade we furnished the following nine trees as pillars in the triple arrangement to support the roof, namely: American Linden (Tilia Americana), Sugar Maple (Acer Saccharinum), Black Cherry (Prunus Serotina), Green Ash (Fraxinus viridis), Sweet Birch (Betula lenta), Chestnut (Castanea dentata), American Beech (Fagus ferruginea), Eastern Hemlock (Tsuga Canadensis), and White Pine (Pinus Strobus).

The general exhibit, to say the least, was small when we consider

the space secured and the excellent reservations we had to draw upon.

There were 68 samples of forest trees in sectional blocks, averaging over 4 feet in length and an average tree diameter. These were half polished and half natural condition and typical of our trees as they appear throughout the State. Also 95 specimens native of Centre County, 50 framed water colors of forest leaves and 60 framed photographs of Pennsylvania trees. Another collection contained some 693 woods of the world that had quite a commercial interest attached to them.

Michigan claims first position among the States in the lumber business, and her exhibit of forest trees was a very creditable one, while the Agricultural College took a step in the right direction of forestry movement, by showing insect enemies and their ravages.

As one evidence of lumber industry in the State, in 1881, their mills sawed lumber sufficient to load a train of cars 2,470 miles long, each car carrying 10,000 feet.

Another evidence of the size of this industry was a load of 50 white pine logs still on the sleds, aggregating 36,055 cubic feet, measuring 33 feet 3 inches in height and weighing 144 tons. This load, however, was adjoining the stock pavilion and not in Forestry Hall.

The Alpena Sulphite Fibre Company showed their paper fibre in various processes of manufacture.

Next in rank to Michigan is Oregon, which "claims to have 25,000 square miles of internal and coast line covered by a growth of timber, the like of which, in diversity and size, no similar space on earth's surface can boast."

Among the exhibits was the State's collection of commercial woods, a spruce log, 10 feet diameter, 25 feet from the butt, and a small house built of 35 varieties of natural timbers.

Chief of these is the Douglass, or Oregon Pine (Abies Douglassii), Red Fir or Red Hickory, one of the grandest trees of the continent and one of the most important to commerce, frequently reaching 200 and 300 feet in height. This is called a pine, nevertheless it is a spruce.

Their principal Pine is the Oregon Yellow (Pinus ponderosa), and their principal Firs the Western Balsam (Pina grandis) and the Noble Fir (Pina nobilis), which frequently reaches 200 feet.

They have 3 oaks in Oregon as useful as ornamental, which are

different species altogether from ours, but delight in the same common names, as, for instance: their White Oak is Quercus garryana, not our "Alba;" Black Oak is "Kelloggii," not our "nigra," and Live Oak is "chrysolepis," not our "virens."

And in their Maples they have two widely different from ours and also each other. The Broad Leaf, Acer macrophyllum, used for household furniture, and the Vine Maple, Acer circinata, so small as to be of no value but for barrel hoops.

Oregon Grape (Berberis aquifolium) figured prominently also as a wood. Alongside of Oregon's exhibit was that of Washington's, and it consisted of 44 species, many of which were peculiar to the State, while others common both to Oregon and Washington. One fir log in particular was 24 feet long by 6 feet square.

The State Building was attractive from its novel construction. The superstructure rested on a foundation of large fir logs, squared, reaching nearly to second story, all donated by large lumber manufacturers.

The tall flag pole in front of the building was 238 feet high and consisted of one single tree, a fir and they claim it to be the largest flag mast of its kind in the world. Washington contributed all the flag poles on the grounds. There was a fine display of woods or timbers in this building, but for lack of space they could not be shown to advantage.

To California must go the glory of the only State furnishing those Forest Giants, the Redwoods, Sequoias sempervirens and gigantea, for who will ever forget the delight on beholding that magnificent room in the Woman's Building, furnished throughout from these woods; or, the sensation either, of having his chest "stove in" while making the rounds of that Redwood Bark trunk placed in the centre of the Government Building and furnished with but one small entrance.

Against southern end of Forestry Hall, a varnish firm exhibited the largest plank in the world, made from one of the Redwoods, presumably Sequoia gigantea.

Dimensions of plank were 16 feet 5 inches in width, 12 feet 9 inches in length and 5 inches thick.

The tree from which it was obtained was undoubtedly 1,500 years old, 300 feet high and 35 feet in diameter. The plank was cut from a section 28 feet above the base.

Arizona had a collection but not large enough to attract my attention.

Colorado had a well selected and well filled collection of her trees, carefully arranged, so also had Connecticut, with that crowning glory of hers, the "Mystic Myristica," swinging aloft over our heads, in that rustic bower of curiously formed branches.

Quaintness characterized her exhibit, as many odd forms of trees and twigs did silent witness to the latent genius of the State.

Looking down list of States alphabetically, notice but two I's, "eyes," and both capital ones, too—Idaho and Indiana.

The former having but a small space allotted, showed well, however, some sections of trees, planks of red cedar, tamarac, yellow and white pine and several minor articles of little interest to general public, while the latter had specimens of native trees and maps showing their distribution throughout the State.

Kentucky had a large space and very creditably overflowed it. Most of the timbers showing transverse sections of good sized trees. The commissioner was a very agreeable man of the Kentucky Colonel type and whose fund of information far exceeded stock on exhibition.

While conversing with him on Chicago Day, he said it was amusing for him to see the great amount of satisfaction, crowds of people derived from passing through the hollow trunk of a large walnut tree.

This State exhibited more black walnut material than any of the others; also took the lead in curly maple and wavy white poplar (Liriodendron tulipifera).

Louisiana showed sections of her timbers, some cypress planks 4 feet wide, magnolia planks, a pavilion of Louisiana woods and gray and black mosses, and some cypress knees.

Massachusetts displayed a goodly number of her trees and so did Minnesota, who besides her fine wood collection deserves little mention as the only State beside Pennsylvania that made special mention of her pillars under the colonnade.

They were White Pine (Pinus strobus), Rock Elm (Ulmus racemosa), and White Oak (Quercus alba), with these side supports of smaller diameter, Butternut (Juglans cinerea), Black Ash (Fraxinus sambucifolia), White Maple (Acer dasycarpum), Basswood (Tilia americana), Yellow Birch (Betula excelsa), and Red Oak (Quercus

rubra). Missouri, Nebraska, New York, North Carolina and Ohio each had good collections of representative woods, North Carolina's arrangement being particularly fine and well adapted for showing each specimen. They seemed of unusually large size in diameter and if typical of her forests, the Pacific States of Oregon and Washington have a good-sized rival on the Atlantic border. Large photographs of forest scenery accompanied the sections; also concise description of each tree and its uses.

North Dakota and Utah each had large sections to illustrate this timber without reference to any particular species or family of them.

The Disston Land and Drainage Company displayed typical Florida trees in large sections.

Kansas, a walnut log, 48 feet long, and 78 inches diameter base and 48 inches at top.

Virginia showed collections of several counties, cleverly prepared, while her neighbor, West Virginia, showed not only a great variety of her types of trees, but also mounted specimens of insects and their havoc with trees.

Among New York exhibitors was Prof. Hough, who had the finest display or arrangement for showing the life history of the tree that there was in the building, and easiest of study. One system was that of 4 winged standards of glass covered mounted specimens of the tree in its infancy, roots, stem and first or few pairs of leaves on one sheet of herbarium paper, another showing flowers and fruit, a third, probably, typical leaves and the fourth, paper would most likely have a diseased specimen or one showing insect havoc, or elegant photograph of specimen area.

His arrangement of woods showed them in pieces of about 4 feet high, an average diameter of the tree, vertical sections as well as transverse.

The Jesup Collection of N. Y. Museum Nat. History, New York city, was represented in miniature by sections principally longitudinal about 12 x 14 or 16 inch but with a card history attached, making an interesting exhibit.

This and Michigan and Nebraska were the only States which showed any attention to this matter of insect enemies outside of Government display.

Wisconsin exhibited over 70 varieties native, also many fine timbers for furniture, notably sandbox willow, curly oak, canoe birch,

speckled alder, scarlet thorn, red basswood, hard maple and elm freaks, curly birch, bird's eye maple, etc.

With the mention of the large room, called the Southern Pine Vestibule, from its construction, I will close on our home exhibit; beg your pardon, I shall ask you to step out to the "Big Tree Inn" and up to its bar of what I should say was composed of one entire piece of Oregon Fir, about 4 feet square and anywhere from 60 to 100 feet long. Nobody ever could tell 5 minutes after he was in there, just how long it was.

Yes, but there remains Illinois exhibit, which was not in Forestry, but her own State Building, and nothing but praise can be said for her that she fairly outdid herself.

These were the States that had sufficient interest in thé forests and forest industries to show them to the world, and we hope that our foreign friends were as well pleased with the result as we ourselves were.

AMERICAN MILK-SUGAR.

WILLIAM B. THOMPSON.

Read at the Pharmaceutical Meeting, December 19, 1893.

As a contribution to the College Collection of Specimens, there is herewith presented some crystals of milk-sugar of unusually large size and attractive appearance. These are the product of the American Lactose Company, operating at Plainfield, N. J. These crystals, do not, of course, present the whiteness of those of the "so-called" cob-sugar—crystallized on flexible sticks, instead of on strings, as in the manner of rock, or sugar candy. This modified appearance is due, as is well understood, to the contained water of crystallization drying in this shape being quite unpracticable, without involving loss of form. This specimen is nevertheless *pure*, and reflects a great degree of credit on this attainment in American enterprise and industry. It is one of the developments of industry and gain fostered by a protective tariff, protecting *all*, not the *few*—the duty now imposed upon milk-sugar stimulating American enterprise in this as well as in numerous other directions. When we reflect that the thrift of a nation, with the careful utilization of its natural products, and the development of all its resources constitute the wealth of that nation, we can see without further reasoning how important it is that the bountiful supplies which Nature affords are

placed within the reach of man to supply his wants and to furnish his luxuries. No country can equal America in the extent of fertile agricultural area, or in the immensity of its dairy products. How much of the latter has heretofore been consigned to waste, one can almost calculate when the amount of the output of milk-sugar of the numerous plants now engaged in this manufacturing industry is estimated, and this branch of enterprise is but yet in its incipiency!

There are, however, other facts in this connection upon which the American student of pharmacy and chemistry may reflect with some degree of profit; one of which is, as these enterprises become new in this country, are conceived and put into execution, a difficulty is invariably met with at the outset. This consists in the want of expert knowledge, and of experience in the lines under experiment and investigation. As a consequence, it becomes necessary for success to fall back as well as rely upon foreign skill and talent to achieve the needed results. This is evidenced in the many industrial establishments of our country, where the science of the chemist and the art of the pharmacist are ever in requisition. Now, whilst pharmacy may and does constitute a distinct branch of science, it nevertheless reaches out in many collateral directions—and all these may be pursued even whilst pharmacy is sustained as a chief occupation. If there is a plethora of pharmacists there, never a plethora of practical knowledge in those branches of science which are so closely interwoven with and allied to the pharmaceutic art. Therefore, it seems well to direct the attention of the younger aspirants to these avenues of employment and remuneration and to stimulate those who are about to pursue their favorite study and to turn their thoughts and time to a more diversified study of the directions which surround them. This is urged to the end that pharmacy may not only be usefully advanced in its sphere, but that its votaries may gain eminence and fame in the direction of knowledge applied to art, and above all, that to the beginner it may be viewed as an open door, through which they may successfully enter the arena of more diversified pursuit.

December 19, 1893.

THE WORLD'S COLUMBIAN EXPOSITION FROM A BOTANICAL STANDPOINT.[1]

By Henry Kraemer.

The botany of the World's Columbian Exposition may be said to have been a subject of at least some interest to everyone that visited the Fair. And while attention has been called to the fact that in only three places in the great Exposition did one see the placard with the name "Botany," still it was important and noteworthy that three buildings were entirely devoted to the exhibition of some of the products of the vegetable kingdom and that all of the others contained more or less exhibits of a botanical nature. Much may be said regarding the momentary inspiration one received upon beholding the building and grounds for the first time. It might be compared to that of an ideal realized and personified. In reality it was akin to that which one receives upon beholding a young man (say on his commencement day) whose powers are not only strong, but whose pecuniary position is as strong and whose every action is a story of ideal endeavors and splendid successes.

In endeavoring to select that which will be of interest to us and of bearing upon our subject to-day we must forego mention, certainly in detail, of those objects which are likely to be seen again or are of a purely external character. For convenience let us first look into that building which was one of the most conspicuous at the Exposition—the Agricultural Building. In this building 37 of the States of the United States and 35 foreign nations had exhibits. The nations and States participating utilized their principal products in the construction and ornamentations of their pavilions. The medicinal specimens were not, generally speaking, of much interest, not so much because these were not interesting exhibits, but mainly because the arrangement, labelling and nomenclature was so poor, that it was difficult without considerable labor to obtain even the slightest information relating thereto. Mention may be made of Eucalyptus oils; an assorted Cape gum, being an exudation from Acacia horrida; a solid block of Cape Aoles, 18 inches wide, 2 feet high and one foot thick. Several blocks of honey and wax of about 50 pounds each. Rolls of cinnamon with cinnamon peelers tools.

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[1] Abstract of paper read at Pharmaceutical Meeting, Dec. 19, 1893.

More attention was paid to the agricultural and economic side of botany than to the medicinal side. Woods of all kinds were displayed, being worked up and polished to show their especial adaptability to all kinds of ornamental and useful work. An interesting product was a quantity of cassava bread (see Amer. Jour. Pharm., 1891, 391). Canada exhibited a section of Prunus virginiana, 44 inches in diameter. Ceylon exhibited tea and coffee from more than 100 estates, one sample of tea being valued at $175 per pound. Germany exhibited the processes for, and products resulting from, the manufacture of sugar from the beet-root; of spirit from potatoes; of starch from potatoes; of starch sugar by the inversion of potato-starch; of the manufacture of pressed yeast; also those of malt making, beer brewing and vinegar manufacture. These are industries involving botanical questions and belong to the department of physiological botany. The time is fast approaching when botany will be recognized by the biologists and chemists to its fullest extent and given credit for all its work. That this is already the case with the biologists, we need but to recall the recent discussions and examine the prospecti of some of our leading universities during the past year. In some of the "chemical" industries biologists (botanical biologists) are absolutely necessary for the production of good products. An object of special interest in the German exhibit was a pavilion of chocolate 30 feet high and made of 30,000 pounds of material!

The Japanese showed a spirit of enterprise which was possibly unsurpassed by any country or State. Rice was abundantly shown in all its varieties. The glutinous rice is chiefly consumed by making it into the form of cakes, called "Mochi." Upland rice or "Okato" is, generally speaking, far inferior in its taste when cooked to that of the ordinary rice grown in paddy fields, although there is but little difference between them in chemical composition. Many of the products of rice were exhibited. An interesting cultivated plant was Yegoma (Perilla ocimoides), which yielded 17 per cent. of a drying oil, which has the property, when mixed with other oils, that solidify in the cold easily (as Rape seed) of preventing their freezing. The products of Haze fruit and Lacquer fruit were also shown.

Among fibres may be mentioned *Mao fibre*, the production of Boehmeria nilvea and *Banana fibre*, the product of Musa basjoo.

The fibre of Mao excels that of hemp by its flexibility, fineness and high lustre. The finest quality is consumed in the weaving of costly cloth, which is highly esteemed by the Japanese for summer dresses. The poorer quality being used for making fishing nets, angling lines, etc.

Among barks used in paper-making were exhibited the *Paper Mulberry* (Broussonetia papyrifera), *Mitsumata bark* (Edgeworthia papyrifera) and *Ganpi bark* (Wickstrœmia canescens). Specimens of raw and bleached bark with specimens of paper were exhibited. The Ganpi bark is valued, especially in producing a smooth, fine and high lustred paper. Japanese paper is usually made from two or more raw materials, and is very seldom prepared from a single material. Moreover, the fibre of Ganpi and Mitsumata are not strong enough singly, yet they are extensively used with other coarse raw materials in order to give the tenderness, smoothness and lustre to paper of low quality.

Tobacco from 9 prefectures were exhibited. The product of Kokubu is most highly esteemed by the Japanese. There were also exhibited some fine specimens of peppermint oil and menthol crystals. These products are yielded by Mentha arvensis, a plant cultivated from a very remote age in Japan. All the specimens exhibited came from the Yamagata prefecture, from which the exported products are also obtained. In cultivating the plants, the land is well prepared in the month of October, and the roots separated from the stubble are cut to lengths and planted in well prepared soil in rows. In the next spring a dilute ordure is given the plants when they grow vigorously. The first cutting is done in the middle of July, the second in the middle of September and sometimes, but rarely, a third cutting is made in some districts. The plant is dried under a shed without exposing to the sun and carefully kept for future distilling. The best time for distilling is said to be the middle of January.

Among edible dried products of plants may be mentioned the dried sweet potato. For preparing this a certain quantity of cleanly washed potatoes are placed in a suitable basket and immersed in boiling water for a short time, then removed from the basket, cut into thin slices, spread over mats and exposed to the sun for two or three days. A superior quality is obtained by peeling off the skins before slicing. Other dried products were exhibited.

Summing up the products exhibited in this building we mention that tobacco in all its forms was displayed with machines and appliances for curing it and manufacturing cigars, cigarettes and snuff, as well as insecticides and methods with appliances used to endeavor to stay the ravages of the tobacco worm and other parasites. Cotton on the stalk was shown in all its varieties; with methods of planting and cultivating as well as the methods and machines used in picking, ginning and baling it. Likewise hemp, flax, jute, ramie and other vegetable fibres were displayed in their primitive forms and in all stages of spinning. Malt liquors with machinery and processes employed in fermenting, distilling, bottling and storing these beverages. Models of breweries in operation. Among vegetable oils were cotton-seed, olive, rape-seed, linseed, palm, etc., with the seeds and seed cakes as residues. Starches were exhibited with processes of manufacture from all sources, from cereals, tubers, arrow-root, plantain, cassava, zamia, manioca, tapioca, sago, pearl, flour, etc. Sugar-cane, beet-root and sorghum were exhibited in the raw and natural condition with the processes which finally yielded the commercial syrups and sugars. Sugars from palms, maple and milk were exhibited. To the agriculturist the different State exhibits were of interest, as the hives with the many varieties of Apis mellifica were displayed with all the modern appliances in the production of honey and wax. Some of the fertilizers of fossil and animal origin were of some degree of interest and of great importance. The exhibits of food stuffs were displayed in many instances in a striking manner.

The seed displays were divided between the horticultural and agricultural buildings. In the latter the field seeds were supposed to be shown to the greater or less exclusion of the garden seeds. The display of a firm of Paris (Vilmorin-Andrieux et Cie), in the French Section, was in the nature of a well-ordered botanical museum. On the walls were hung panels of wheat, specimen charts showing the sugar yield of beets and the starch yield of potatoes, and illustrations of their farms. They had 14 glass cases with models or casts of representative types of vegetables and strawberries. With the exception of a small collection of photographs in the alcoves of the Experimental Stations Exhibit, here seemed to be the only attempt to show anything of the results of hybridization. The name of Vilmorin has long been connected with experi

ments on the crossing of wheats and some of the graphic results were shown in small sheaves mounted upon tastefully framed green felt. Here were exhibited, also, models of representative average and normal forms of vegetables. The prime value of these models with their excellent arrangement was that it afforded the student a means of fixing the conventional standard or type and illustrating the chief lines of development and variation as arising therefrom. Two of the specimen charts were unique. One comprised six glass tubes about an inch in diameter and five feet long, containing proportionate amounts of "sugar in the juice," and refined sugar in the leading sugar beets. A similar chart displayed the starch yield from the varieties of potatoes. Altogether the exhibit was just such a one as a teacher of economic botany ought to possess in his museum and use in his teachings.

The Japanese garden was considered the unique feature, and has been acknowledged as a good example of Japanese art. It was 22 x 141 feet in extent and comprised 2,000 distinct plants. It was intended to represent such a garden as is to be seen adjacent to a dwelling house. Here were the hillocks, the cascades, the stone lamps, the sheet of water and the summer houses hidden in the clump of trees. Upon either side of the central walk were a miscellaneous collection of plants, so thickly planted as to nearly hide the earth. This walk passed over an arched bridge, which was peculiar in its construction. In the rear were blue and green sprays of Juniperus littoralis projecting over the water, while in front were large and small Azaleas, ferns and red-berried Adrisias. Among some of the interesting plants from Japan was a Thuja orientalis, about 3 feet high and 8 inches thick at the base. It was reported to be 100 years old, but its growth was so curtailed and dwarfed that it appeared as a very small shrub. In order to produce this result, the limbs of the trees are tied with ligatures, and at the same time they are placed in such positions that they will grow into the most fantastic shapes imaginable. The result is we have some trees reduced in size and presenting almost as hideous an appearance, compared to the original, as would a human being, whose limbs and body were dwarfed, tortured and twisted out of all shape. A number of the genera were thus represented. One Cypress, reputed to be 300 years old, perished with the cold of the previous winter. Some of the ancient crooked Maples were but a foot high,

in some of which every leaf had been carefully trained and others bore several varieties on the same top. A Pine tree was exhibited with gnarled branches and massive roots. In some of the Pines the needles were held in place to produce a fine cushiony effect that is so highly prized.

The Azaleas exhibited were of much interest. The most striking ones were large and free-growing bushes of Azalea indica, which earlier bore single dull red and pink flowers. One variety in particular, called Mitsusomekuruma, attracted considerable attention on account of its very small greenish-white flowers. There were exhibited also several varieties of the Ghent type. Here were two exceedingly curious forms reduced to five separate and long strap-shaped divisions. In one instance of the mollis type, the petals were red and spotted and the stamens were wanting. Another of the Indica type possessed dull pink or red petals and long red filaments entirely barren of anthers, giving the flower a strange spidery look.

Proceeding to the viticultural displays, we saw a most decorative sight, although there was but little genuine horticulture in it. In considering the grape interests, it would be well to divide the subject into two parts, as the Italians and some others have done: viticulture or grape growing and viniculture or wine making. Viticulture was shown by illustrations of the vine and its varieties in natural and artificial ways by cuttings, engravings and photographs. Methods of planting, staking and training the vine were to be observed, as well as the methods of and appliances for cultivating, harvesting, curing, packing and shipping the grapes. On the other hand, viniculture was demonstrated by the methods employed in expressing the juice of the grape; of fermenting, storing, racking and bottling, and finally shipping the wine.

The Deutsche Wein Austellung contained a larger variety of hands and number of exhibitors than that of any other wine exhibition in the Exposition. The German Wine Building was built in the form of a cloister cellar. The interior space being occupied with tables and stands of wine in bottles, being the combined exhibition of 289 growers and dealers of the German empire. The arrangement was simple, but the chief attraction lay beyond, upon the eastern and southern walls. Upon these sides, in the form of panorama, some of the most striking of the wine regions of

Germany were depicted. One looked as from a porch upon a landscape of remarkable picturesqueness, and the effect was greatly heightened by the plantations of grape vines in the foreground. These grape vines were the actual plants brought from the neighborhoods represented upon canvas and set in the earth as they customarily grow. Of course the vines themselves were not living, but were, however, dextrously clothed with artificial leaves and fruits, so that they almost perfectly represented the growing and bearing vine. As each of the panoramas represented a distinct wine district, so the wines in each of the foregrounds, showed the exact method of training employed in those districts, and the artificial fruits and leaves represented the varieties grown there. There were many panoramas in the Exposition, and there were none more perfect, nor probably more interesting (unless it was that in the Electrical Building) than these of the German Wine Building.

California's exhibit occupied nearly one-fourth of the ground floor space of this department. It was certainly with a feeling of pride that we viewed the efforts and progress of this comparatively young industry in the United States. One of the most notable pavilions was erected by four companies of wine producers. It was constructed of a section of a giant sequoia, which was 30 feet in diameter at the base and 290 feet high. Growing up from the base of the tree were grape vines with an abundance of ripe fruit hanging from the vines. In the interior were the exhibits of the four prominent houses. The exhibit of the vineyard of the late Senator Stanford showed, in a perspective view, the natural size of a section of the cellars of the vineyard which have a storage capacity of 5,000,000 gallons. This vineyard is probably the largest in the world, containing 3,840 acres, and producing annually 16,000 tons of grapes. Besides the exhibits of 25 smaller firms, the State Board of Viticulture had an instructive exhibit of photographs, engravings, etc., showing methods of cultivation of vine, etc.

The Japanese had a small exhibit. One sample of wine called "Seijyunbudosyn" was labelled with the following: "This wine can be recommended as nothing equals it under the sun." The Italians were represented by 130 firms displaying 560 brands of wine. The oldest vintage of record being that of 1812. The Russian Imperial Appanages exhibited a model of one of the principal wine cellars of an estate in the Caucasus with a capacity of about

432,000 gallons. There were some interesting exhibits by a number of exhibitors of woods, herbarium and seed specimens with photographs of the grapes and in some cases a display of the grapes themselves. Vitis Lincecumii, Buckley and its hybrids, seemed to attract some attention as being a source of fine quality of grape.

Among the fruits, those of the Citrus genus constituted one of the greatest attractions of the Fair. The largest single exhibit consisted of a column 35 feet high covered with nearly 14,000 oranges and some lemons. Lemon growing, while a comparatively recent industry in America, is looked upon as a paying product by the Californian people. The most remarkable, as well as the most handsome lemon in the exhibit was the "Bonnie Bræ," shown in the display of San Diego. It was long and smooth and possessed a short tip, a thin skin and was seedless. The fruit of Florida is earlier than that of California, but seems to keep better.

The lawns about the Horticultural Building were well provided and represented by some of the products of the leading botanical gardens of the world. The original design of having them bloom in their season was wondrously carried out. During May the Azaleas excited the admiration of the spectators, as their flames of color eclipsed that of all other plants flowering at that time. In early June 10,000 rhododendrons were the chief attraction. They are probably the most showy plant and carry with them an air of massiveness and stability which makes them beautiful. During June and July some 50,000 roses, including over 2,000 varieties, were most conspicuous and again "carried the day" and days. Was not this wonderfully suggestive? The roses of the world were here flowering at one and the same time and saying, peace, my peace, our peace we give unto each other. Later came the cannas with their fiery plumes and then followed the chrysanthemums and cosmos ,the much prized and fashionable flowers of early spring. Besides these many other flowers were in bloom.

In the Manufactures and Liberal Arts Building were a number of botanical exhibits. Of particular interest were the colored models and charts exhibited by Germany and Japan. The petrified wood specimens from the forests of Arizona were indeed large and beautiful. Ice coolers, fountains, mantles, table tops and many ornaments were made therefrom. We were much interested in the ornamental application of the products of the Cactaceæ. It has

recently been found that the cacti growing at different altitudes vary widely as to their general structure; that those, for instance, growing in high altitudes possess a finer grain than the same specimens growing in the valleys. The wood of the former being more compact and not so porous has been found to be admirably adapted to the manufacture of a variety of ornamental articles. For manner of treatment of wood, etc., see *Scientific American.*

The exhibit of New South Wales was large and instructive. The Technological Museum, under the direction of J. H. Maiden having arranged every exhibit with full descriptions and applications. In this manner were displayed the economic plants, the substances used as food chiefly by the Aborigines, gums, resins and kinos from indigenous plants, tan barks, a miscellaneous collection of barks of economic value, indigenous fibres, galls and specimens of Australian economic entomology.

There was also a case of fibres handsomely mounted, 20 fine illustrations, 10 x 12 inches, very faithfully colored, from a forthcoming work on North American fleshy fungi, by Farlow, and a set of the published writings of Dr. Gray.

In the department of pharmacognosy the Pharmacy Department of the University of Michigan, was the only institution that endeavored to show to the world the work she was doing. I was much impressed with her display of herbarium specimens of plants in connection with commercial samples of the various parts employed in medicine. In a similar manner were displayed many of our prominent plant drugs, as rheum, kola, mate, guarana, tea, coffee, guaiac, cubebs, nux vomica, ignatia, etc., with their chemical constituents. A capital "kindergarten" idea for a student's museum.

Coming to the State Buildings, we find that many of them were not erected for exhibition purposes, but simply a kind of a club house for the use of both men and women. Some few, however, were exceedingly energetic, and their displays were not only interesting but instructive. Illinois, being in a sense, the host of the Exposition, had by far the most portentious structure. It was constructed almost entirely of the products of Illinois. The agricultural exhibit is very large. Upon one of the walls was a most ingenious work of art. It consisted of a typical farm scene, with houses, animals, fields, crops, workmen, etc., made from the products of the State. The whole gives the idea of an oil painting, so per-

fectly had the blending of colors from the natural grains and grasses been made. Upon one side of the frame was a heavy drapery, giving the effect of silk, it also being made of different grasses.

The exhibition relating to botany was probably the most complete exhibit illustrating the teaching of botany to be found at the Exposition. There was to be found a working desk equipped for an undergraduate student and another for an advanced investigator. Also a series of microscopes formerly used in contrast with those now used. Also sets of permanent mounts, reagents and stains employed, apparatus for photomicography with photomicrographic enlargements, a very full bacteriological outfit with living cultures, an herbarium, etc. The Experiment Station exhibited a long case showing the diseases of cultivated plants and a collection of seeds of wild plants. Outside of the University exhibit there was a pavilion constructed of all the different woods grown in the State. Inside were samples illustrating the varied uses to which the various woods are put. There was another pavilion constructed of the products of the corn. The very uprights were grown in a corn-field, the roof being a thatch of stalks. All the decorations are typical of corn; the silky tassels served for frieze and dado, while the corn in the ear was arranged according to combinations of colors into many fantastic designs.

The State of Washington made a creditable exhibit. In front of the building was a mast, being a straight piece of fir, 3½ feet in diameter at the base and 215 feet high. The south and north wings each rested upon one piece of timber, 3 x 3½ feet and 125 feet long. Each of these pieces was cut from a yellow fir tree 7 feet 11 inches in diameter and 340 feet high. There was a life-size full length of Washington, which had a frame made entirely of small pieces of wood, being inlaid with 77 different kinds of wood found in the State. Besides an interesting agricultural exhibit, there was one of the best herbaria to be found in the Exposition, in that the collector had given considerable information upon the labels regarding the occurrence of the species exhibited.

To the systematic botanist, the herbarium specimens, illustrative of the flora of Minnesota, Colorado, Montana, Missouri, Kentucky, Wisconsin, etc., were of considerable interest. In the construction of their buildings and in their displays the Western States, more particularly the younger States, realized that this was their oppor-

tunity of making known to the world their individual natural resources. They endeavored to and succeeded well in many instances in so arranging their products that it would strike the heart of the home seekers of limited means and the pocket-book of the capitalist seeking fields for the investment of his superabundance. Before closing this part of the description of the Exposition, reference should be made to the excellent collection of Cacti in the Territorial (Arizona, Oklahoma and New Mexico) Building. Here was a Cereus giganteus or "Sahura," as it is called, some 15 feet high, possessing a cristate top some 4 feet broad. Coming to that of Ceylon, we learn that her "Courts" were constructed entirely of native wood. Here was the principal exhibit of her tea, and much valuable information could be obtained from the publication of Ceylon and from the attendants. In the Merck Building were 36 wax models of medicinal plants. A number of specimens of opium, with scarificators and knives employed in obtaining the gum. Even in "Midway Plaisance" were some things of botanical interest to be found. Here the groves of orange and lemon trees, the Samoan houses and the Javanese village.

In conclusion, we referred to the momentary inspiration upon seeing that magnificent collection of buildings at the Columbian Exposition as being akin to that when beholding a young man upon his commencement day—surrounded by the rainbow of promise. This Exposition which we have seen was really but the repetition of a commencement day's experience. We long before anticipated a supreme pleasure as we thought of going from one exhibit to another, collecting data and securing information from every available source of the world upon botanical matters. In this we had a similar experience and disappointment to J. C. Arthur, of Purdue University, who wrote (Bot. Gaz., Sept., 1893) that "there is considerable material through the Exposition of interest to botanists, but it is so widely separated and in the main so difficult to find, that it is likely to be largely missed by those who would receive the most benefit from the display." Also, "very few of the exhibits are accompanied by adequate information, sometimes they are entirely unlabelled, and as a rule the attendants, if they can be found, can add little if anything." This was to be expected, perhaps, in that the Exposition was a general exhibition. The managers certainly of the botanical part evidently did not appre-

ciate the details nor impress others with the possibilities that was here presented for a most remarkable and unprecedented educational exhibit of scientific methods and results. Here, as in so many other cases, the evil was increased by the perversion of the public taste, which causes work to be admired not in proportion to their fitness for their purposes or the skill evinced in attaining that fitness, but in proportion to their size and cost.

The last quarter of this century has witnessed a most remarkable development of specialization of labor. With the death of Mr. Darwin, we might say, was the extinguishment of the last scientific light that was able to illuminate equally well any and all departments of science. And as for the affairs of the world at large, it has been many centuries since we have had the men of whom it might be said "they have mastered all the knowledge of this day." And so in this discussion of the botany of the World's Fair, while we criticise, for to discuss was to criticise, we do not belittle the efforts of these gentlemen, for under the circumstances we do not feel possibly that we ought to have expected of them more than we do of a student upon his commencement day.

We hope that this is the last of the great general World's Fairs. They may be very interesting and of some profit (like the displays in our large stores during the holiday season) to the average mind, but they do not receive the support or the attention of the highest intellects in the contribution of their best work. And this best work in every department where skill is demanded will at the same time do the average person infinitely more good (just as a college education) than the showy and often tastily executed exhibits of a general nature, attended with simply one's own interpretation are largely intended as a means of commercial advertising. It is not my purpose at this meeting to expand upon this subject, but suffice it to say that we believe there should be in the future expositions having more a *specific character*. In the exposition of a scientific nature there should be a council composed of the most renowned and most capable scientific men who should be given sufficient time and who should have the same means at their disposal as this Exposition Committee for securing the contributions and support of the best institutions, societies and individuals of the world. Furthermore these exhibitions should be periodic and yet in a certain sense made as permanent as possible, so that additions and corrections

should be made (similar to the Committee of the U. S. P.) We are aware of many objections that may be raised, but these in time, after reflection, might, too, vanish like the stagnant pools and marshes in the suburbs of Chicago upon which the White City was built.

By way of further suggestion let us see what a World's Botanical Exposition might contain. One building might be devoted to the interests of morphological and systematic botany. Here could be displayed the models, charts and methods illustrating the study of morphology. Also the different methods of collecting, drying, preserving and classifying plants. Laboratories might be equipped and work shown with information thereupon given. A similar exhibit might be made in the building devoted to anatomical and physiological botany. In the building devoted to medical botany, an exhibition (as interesting as that in the Manufactures and Liberal Arts Building might be made), consisting of panoramas and illustrations of the cultivation, collection, preparation, with specimens, etc., of our important and interesting vegetable drugs. There would be other buildings illustrating horticulture, arborculture, viticulture, viniculture, agriculture, geographical and fossil botany, as well as the other industrial, ornamental and economical sides of botany.

It must be apparent that an exposition of this kind, botanically, would be, if properly managed, of a highly instructive and most interesting character to the world. The name of some one or of some event of world-wide importance would be necessary to arouse the interest in such an Exposition. Might not the name of Linnæus do this? Is it too much to hope that the next World's Exposition might be a botanical exhibition and called the World's Linnæan Exposition, to be held beginning May 23, 2007, in honor of the third centennial anniversary of the birth of Linnæus?

THE UNITED STATES PHARMACOPŒIA OF 1890.

By George M. Beringer, A.M., Ph.G.

[*Continued from p. 24.*]

The formula for Trituration of Elaterin should have been omitted as the general formula for triturations is sufficient and more exact in the directions.

The *official* troches as a class are sadly neglected by the medical profession, and from a pharmaceutical standpoint they are badly in

need of a more thorough revision than they have obtained in this edition. But one actual dismissal has been made, that of Troches of Magnesia. The substitution of Troches of Santonin for Troches of Santoninate of Sodium was but a correction of this at once acknowledged error of the Pharmacopœia of 1880. We are of the opinion that Troches of Chalk and Troches of Ipecac have become obsolete and should be omitted, and as the preparation of peppermint and ginger lozenges appears to be left to the confectioner, these likewise could be spared from the official list. We are disappointed in not finding, as additions to the class, some of the frequently used troches, such as those of benzoic acid, cocaine, guaiac and its compounds and kino.

The *compressed* lozenge, although almost universally used, is not officially recognized. It could have been adopted in place of the *mass* lozenge for most of those in the official list. As a class the official troches are not in harmony with that marked spirit of progress that characterizes the volume generally. The most displeasing feature is the absence of any uniformity in the size of the finished products. They vary from ·42 Gm. in Troches of Cubeb to 1·56 in Troches of Potassium Chlorate. The latter are unnecessarily large, the former too small. Between these extremes we find all sizes. They could readily have been classed under not more than two sizes: 1· Gm. and ·7 Gm. or ·75 Gm.

With the exception of Troches of Santonin, Troches of Ammonium Chloride is the only one exhibiting any improvement. The popular muriate of ammonium and Licorice lozenge has been introduced, but the quantity of ammonium chloride has been reduced to ·1 Gm. in each instead of about ·15 Gm., as generally made.

The official ointments exhibit but few changes of note. Ointment would have been improved by substituting *benzoinated* lard. Ointment of Carbolic Acid and Chrysarobin Ointment are both reduced to five per cent. instead of ten per cent. Of the three astringent ointments formerly official, the Ointment of Gallic Acid has been dismissed and the Ointment of Tannic Acid and the Nutgall Ointment have been both increased to 20 per cent., just double the strength of those official in the Pharmacopœia of 1880.

The formula for Ointment of Rose Water now given yields a rather odd amount of product 985 to 990 Gm. With the substitution of stronger rose water for rose water in this preparation, it has

been deemed advisable to reduce the amount. If 200 cc. had been directed in place of 190 cc., the product would have been about one kilogramme. The addition of borax materially improves the appearance of this ointment. The directions for the addition of the rose water are that the entire amount is to be added to the waxes and oil previously melted and poured into a mortar, "*without stirring* and then to stir rapidly and continuously until the mixture becomes uniformly soft and creamy." The addition of 20 per cent. of water to the melted fats must necessarily cause congealing of the wax and separation in masses, which would be nigh impossible to beat to a smooth mass. The rose water should be directed to be *warmed* to the temperature of the fusing of the waxes before being added.

The directions given under Iodine Ointment and Iodoform Ointment that they should be freshly made when required might likewise have been applied to such ointments as those of tannic acid, potassium iodide and the mercuric oxides.

The addition of castor oil in Ointment of Red Mercuric Oxide serves well both as an aid in triturating the oxide and in preserving the ointment from oxidation.

A mixture of yellow wax and lard replaces suet in Tar Ointment. A mixture of wax and lard is less easily absorbed than suet and as the stimulating effect resulting from this absorption is desired we would prefer the old formula.

Sulphur Ointment is now directed to be prepared with washed sulphur instead of sublimed sulphur. The small amount of acid present in the latter from oxidation has heretofore been looked upon rather as desirable in this ointment.

The Pharmacopœia of 1880 directed, that in Veratrine Ointment the veratrine should be rubbed up with alcohol before incorporating with the benzoinated lard. It was found that this always resulted in the production of a resinous mass which it was almost impossible to evenly disseminate. The Pharmacopœia of 1890 directed six per cent. of olive oil in place of the alcohol. Both of these are unnecessary additions and in summer time the latter especially would render the ointment too soft. The veratrine should be directed to be rubbed up with about one-tenth of the lard to a smooth paste and this then incorporated with the balance.

The directions for Ointment of Zinc Oxide are to sift the zinc

oxide through a No. 20 sieve upon melted benzoinated lard; a number 40 sieve would be better.

The required alcoholic strength of both white wine and red wine is changed to from 10 to 14 per cent. in place of 10 to 12 per cent. and the method of determining the percentage of alcohol present incorrectly stated in 1880 is now correctly given. Stronger white wine is dismissed and where it was formerly directed in preparing the official wines, white wine, with the addition of 15 per cent. by volume of alcohol, is now ordered. In addition to this the number of the official wines has been decreased by three other dismissals, namely, Aromatic Wine, Wine of Aloes and Wine of Rhubarb.

In the formula for Wine of Antimony 1015 cc. of liquids is directed to yield 1,000 cc. of product. The quantity of white wine directed is 800 cc. instead of a sufficient quantity to make 1,000 cc.

Wine of Ipecac has been increased in strength to 10 per cent. by volume of the fluid extract instead of 7 per cent. The formula, however, fails to direct that the filter should be washed with sufficient white wine to make the product measure 1,000 cc.

Nineteen pages are required for the very complete list of reagents and instructions for preparing the same.

Twenty-seven pages are devoted to volumetric solutions and methods of analysis. We regret that this feature of the book has been marred by a statement made exactly 12 times in the 27 pages "that the figures given may be rounded off when a delicate balance and exact weights are not at hand." This is the more remarkable, as in the introductory note to this subject it is insisted that all volumetric solutions should be made and used at temperatures not deviating materially from the normal temperature, 15° C., and that all measuring vessels employed should agree among themselves in accuracy of graduation, thus avoiding the introduction of errors.

What chemist can, with any satisfaction, make volumetric estimations, using an inaccurate balance and weights?

In a volume whose chemical requirements are so exacting, such slovenly methods should not be condoned. Especially is this to be condemned in the preparation of such volumetric solutions as those of oxalic acid and iodine used to standardize other solutions.

Two pages are devoted to each of the following subjects, gasometric estimations, alkaloidal assay by immiscible solvents and determination of optical rotation of organic substances.

Eight pages are required for a list of chemicals and formulas.

It will be thus seen that 60 pages, one-tenth of the entire volume, are devoted to purely chemical instruction in addition to the many pages already occupied in the tests appended to the official products in the preceding pages. The increase of 115 pages in the present edition, amounting to more than 20 per cent. in the size of the volume, is largely due to this source. This may well serve to illustrate the present tendency of pharmaceutical training toward a more thorough education in chemistry. But it must not be forgotten that if the same privilege be extended to pharmacognosy, pharmacology, botany in its various relations to organic materia medica and other allied sciences that has been assumed by chemistry, the Pharmacopœia would soon become a commentary upon itself. A volume so cumbersome as to be unsuited to its purpose and use.

The Pharmacopœia should not be converted into a text-book on any science. It is with regret that we observe that the present tendency is to forget entirely its legitimate character. The Pharmacopœia is essentially a law book, a volume of statutes. As such, it should content itself with stating accurately the characters and requirements of the official products. Any deviation from this rule is a digression from its true scope. The official volume of the statutes enacted by a legislative body is unaccompanied by explanations and judicial opinions on the application of the laws.

It is hoped that, in future revisions, that the plan adopted will be to leave the methods of testing and of proving the purity of the official chemicals to a special volume compiled if necessary by authorities recognized by the pharmacopœial committee. A volume which shall be to the United States Pharmacopœia what Pribram and Welden "Prüfung Artzneistoffe" is to the new German Pharmacopœia.

Thirty-seven pages are utilized for the various tables. Those for alcohol, the acids and alkalies and for equivalents of weights and measures being especially noticeable for completeness. Forty-two pages are devoted to the very thorough index, which is one of the most commendable features of the book.

Viewed as a complete work the volume is remarkable for its advanced position; for the great progress which it indicates in the coming pharmacist. Its progressiveness and superiority from a

purely scientific standpoint is admitted. The committee evidently had in mind a lofty ideal for their Pharmacopœia. The book is at least a decade in advance of the scientific attainments of the average American pharmacist and is likely to give the impression to our foreign professional brethren that he is the possessor of knowledge and standing, alas, too often lacking. We imagine that we hear many of the class who are more concerned over the commercial aspect than the professional side of their calling, repeat the words of the horse to his groom in Æsop's fable: "Groom me less and feed me more."

I firmly believe that this is a grand step and that it will mark a distinct epoch in American pharmacy; that it will stimulate hosts of pharmacists to renewed efforts to maintain their educational and professional standing, and that it will compel many to a more thorough education in order to stand on the same plane to which this volume will elevate the progressive pharmacist. It is a matter of profound regret that in a volume of such magnificent intent there should be so much to criticise adversely.

In concluding this review the writer wishes to explain that it was undertaken in response to the request of the late editor of the American Journal of Pharmacy, Professor John M. Maisch, for a criticism to be published in parts commencing with the October number of the journal.

In discharging this task, I have conceived it to be my duty as well as to the best interests of pharmacy to unhesitatingly express my views. It has been the aim to avoid all personalities, and if any one has been offended it has been unintentional. The writer has no axe to grind and is personally acquainted with but few of the committee, nor has he any knowledge as to which members of the committee the various parts of the volume can be attributed. I have naturally assumed the position expressed by Mr. Hosea Biglow's candidate:

"There's nothin' thet my natur so shuns
Ez bein' mum or underhand;
I'm a straight-spoken kind o' creetur
Thet blurts right out wut's in his head,
An ef I've one pecooler feetur,
It is a nose thet wunt be led."

Hardly had the introductory lines of this review appeared before the writer was criticised as a pessimist, and his review as being

hastily written. In opposition to some of the views expressed very flattering reviews were quoted. I have no intention of replying to my critical friend who so evidently has misconstrued my position, nor is any defence needed. But I would assure him that it is much easier to flatter than to conscientiously criticise; to swim with the current than to stem the tide. But the latter may be the position of duty, and a review to be of any value must be the expression of independent thought, and devoid of flattery.

I am aware that it has become fashionable for reviewers not to look much beyond the preface, and this is so well known that shrewd authors now so word their prefaces as to purposely give the flattering critic material for his adulation. The true friend is not the flatterer.

I would also assure him that whatever progress is made by pharmacy, and introduced in the next Pharmacopœial revision will be the result of criticism and not flattery.

I would finally assure him that the writer would assume a position not second to any one in desiring a true advance and a scientific elevation of pharmacy.

GLEANINGS FROM THE GERMAN JOURNALS.

By Frank X. Moerk, Ph.G.

Vanillin according to an investigation of Professors Jorissen and Hairs is present in cloves, and can be isolated by extracting cloves with ether, agitating the ethereal solution with a solution of acid sodium sulphite, separating the latter, decomposing the sulphite with a mineral acid and agitating with ether; the ethereal solution leaves a white crystalline residue, having all of the properties of vanillin.—Südd., Apoth. Ztg., 1893, 591.

Cocaine phenylate.—Three formulas have been proposed for this substance to which Dr. v. Oefele again calls attention. (1) The preparation proposed by Viau was a mixture of cocaine hydrochlorate and phenol; phenol being more soluble in solutions of cocaine hydrochlorate than in water, suggested the above preparation. (2) Oefele proposed the fusion of molecular proportions of cocaine and phenol, or about three parts of cocaine and one part phenol; this preparation differs from that of (1) by being almost insoluble in water. (3) Poinsot introduces under the same title a mixture of one

part phenol, two parts cocaine, forty parts vaselin oil, and twenty parts of arachis oil, which are fused together and put upon the market in tubes.—Dr. v. Oefele, Pharm. Centralhalle, 1893, 706.

Sesame oil.—The color test for this oil with sugar and hydrochloric acid which has been considered a characteristic test has, during the past few years, also been obtained with some brands of olive oil originating in Southern Italy and Northern Africa as well as with some samples of arachis oil. Villavecchia and Fabris, in a study of sesame oil, find the principle giving the color to be a dense, uncrystallizable, non-nitrogenous oil, which, in alcoholic solution, will give red color with sugar and hydrochloric acid. In this test there is produced furfurol and this has repeatedly been proven to be the substance which is actively concerned in the production of color reactions as the sugar in all such tests can be replaced by furfurol solutions; the tests obtained by the use of the latter are generally more delicate. A specific test for sesame oil, originating with Villavecchia and Fabris, is based upon the use of an alcoholic furfurol solution (2 gm. in 100 cc.); of this furfurol solution 0·1 cc. is placed in a test tube, 10 cc. of the oil under examination and 10 cc. hydrochloric acid, sp. gr. 1·19 added, agitated for half a minute and allowed to stand; in the presence of *one per cent.* sesame oil in the suspected oil the aqueous solution separates with a red color, while in the absence of sesame oil only a yellowish color is produced. A modification of this test consists in added to 0·1 cc. furfurol solution, 10 cc. of the oil, 1 cc. hydrochloric acid, agitating, adding 10 cc. chloroform to dissolve the oil and noting the color of the aqueous layer; less than one per cent. sesame oil is sufficient to give a fine red color; in the absence of sesame oil no color is to be seen, or in the cases of those *olive oils giving the color with the original test* a *greenish color* is produced.—G. Morpurgo, Pharm. Post, 1893, 537.

Carbon disulphide is employed in chemical analysis by F. Musset as a means of separating small quantities of precipitates, indifferent to hydrogen sulphide, from aqueous suspension; the precipitates, becoming suspended in the carbon disulphide if a small quantity of this be agitated with the aqueous mixture, the aqueous solution becomes perfectly clear so that it can be decanted; after the evaporation of the carbon disulphide from a capsule the precipitate is obtained in a condition for further examination. The advantage

of the method is that the small precipitate is not collected upon a filter, and can be more easily examined. In the decomposition of ammonium sulphide solutions of the sulphides of arsenic, antimony, tin, etc., by hydrochloric acid, the agitation of the acid solution with carbon disulphide removes the precipitated sulphur by dissolving it so that it is possible to say at once if the sulphur was accompanied by any of the above-mentioned sulphides as the latter are not soluble in the solvent; in the presence of these sulphides the carbon disulphide is opaque due to the suspended sulphides, while the aqueous solution is perfectly clear.—Pharm. Centralhalle, 1893, 737.

Peru balsam.—A systematic method of examining this drug for the adulterants, alcohol, resin, turpentine, Canada balsam, copaiba, rosin oil, gurjun balsam, castor oil, other fixed oils, storax, tolu balsam and benzoin is offered by E. Hirschsohn. 3 parts of the balsam are thoroughly agitated with 15 parts petroleum-ether, allowed to stand until the petroleum-ether solution is perfectly clear, when it is decanted and used for the following tests: A portion is agitated with half its volume of water; a transient turbidity of the petroleum-ether and the iodoform test with the aqueous layer (addition of KOH and iodine solution after warming) indicate the presence of *alcohol.* Another portion is agitated with an equal volume of cupric acetate solution (1 gm. in one liter water): A, *an intense bluish-green color*, imparted to the petroleum-ether indicates the presence of resin, turpentine, Canada balsam, copaiba, rosin oil; B, *a colorless or pale green* colored petroleum-ether may indicate storax, fixed oils, tolu balsam, benzoin and gurjun balsam.

A. I. The petroleum-ether solution mixed with half a volume of brom-chloroform (one part bromine dissolved in twenty parts chloroform) gives a red-violet color; the balsam, 2 gm. heated upon a water-bath for one-half hour with 1 gm. freshly prepared calcium hydrate forms a solid mass; one volume balsam and four volumes 80 per cent. acetic acid give a turbid mixture, separating oily drops after several hours' standing. These several tests indicate *copaiba.*

A. II. Brom-chloroform gives no coloration.

(*a*) The balsam with $Ca(OH)_2$ forms a soft mass, with acetic acid a turbid solution from which oil drops separate after a short time; the residue of the petroleum-ether solution is soluble in 90 per cent. alcohol—*rosin oil.*

(*b*) The balsam with $Ca(OH)_2$ forms a solid mass, with acetic acid

a turbid solution which, after several hours' standing, does not deposit oil globules; the balsam with 4 volumes absolute ether, after filtration gives a turbid mixture upon the addition of 5–10 volumes of 90 per cent. alcohol; the petroleum ether residue is not perfectly soluble in 90 per cent. alcohol—*Canada balsam.*

(*c*) The balsam with $Ca(OH)_2$ forms a solid mass, with acetic acid only a slightly turbid mixture, the ethereal solution remains clear upon the addition of alcohol (90 per cent.) and the petroleum-ether residue is perfectly soluble in 90 per cent. alcohol—*resin turpentine.*

B. I. Brom-chloroform with the petroleum-ether solution produces a blue-violet mixture, the petroleum-ether residue with hydrochloric acid sp. gr. 1·19, hydrobromic acid sp. gr. 1·4 or phosphoric acid sp. gr. 1·7, is colored red; the balsam with $Ca(OH)_2$ produces a soft mass, with acetic acid, a turbid solution depositing oil drops after several hours—*gurjun balsam.*

B. II. Brom-chloroform produces no coloration.

(*a*) The balsam with $Ca(OH)_2$ produces a soft mass, with acetic acid, a turbid solution speedily depositing oily drops. The petroleum-ether residue, if soluble in 90 per cent. alcohol = *castor oil*, if insoluble with the separation of oil = *other fixed oils.*

(*b*) The balsam with $Ca(OH)_2$ a solid mass, with acetic acid an opalescent or only faintly turbid solution.

(*aa*) The petroleum-ether solution with cupric acetate is distinctly greenish in color, after decanting and mixing it with hydrogen sulphide solution the mixture becomes brownish; the petroleum-ether residue with nitric acid sp. gr. 1·38, is colored a fine bluish-green—*storax.*

(*bb*) The petroleum-ether solution with cupric acetate is indistinctly greenish in color and with H_2S changes to a pale brown; nitric acid does not color the petroleum-ether residue = *tolu balsam.*

(*cc*) The petroleum-ether solution with cupric acetate is colorless and is not altered by H_2S. The petroleum-ether residue is not colored by nitric acid = *benzoin.*

The following tests, based upon the above, are serviceable in the examination of Peru balsam for purity:

(1) The balsam mixed with half its weight of calcium hydrate, and heated upon a water-bath for half an hour, should *not* give a solid mass; this test by itself is not considered reliable since the addition

of a small quantity alcohol produces a solid mass, while the presence of castor oil (without alcohol) produces a soft mass not differing from that obtainable with a pure balsam.

(2) One volume balsam with four volumes 80 per cent. acetic acid should produce an opalescent or only faintly turbid solution from which no oily drops separates after two hours' standing.

(3) The petroleum-ether solution of the balsam should have a pale yellow color and with a dilute cupric acetate solution (1 : 1000) should not be colored green or bluish green.

(4) The petroleum-ether solution upon the evaporation leaves a residue which should not be colored by hydrochloric acid sp. gr. 1·19.—Pharm. Ztschr. f. Russl., 1893, 369, 385 and 401.

Cupric oxide used by E. Hirschsohn in the detection of rosin in oil of cassia, was found to be unreliable as a reagent because of the different conditions followed in its preparation; some specimens would impart to a five per cent. petroleum-ether solution of resin, upon agitation, an immediate intense bluish-green color, other specimens gave no color or only a faint-green after contact for twelve hours. Studying the conditions for the preparation of a reliable cupric oxide, it was found that if one part crystallized copper sulphate, 0·6 part potassium hydrate and 18 parts water be boiled for two hours, an oxide of the greatest activity is obtained; the oxide should be dried at low temperatures and should not be ignited since this operation will notably decrease the sensitiveness of the oxide.—Pharm. Ztschr. f. Russl., 1893, 705.

ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

To detect iodine combined in the state of an iodide or an iodate, G. Denigès makes use of the ingenious process of Suilliot and Raynaud for the preparation of iodoform, which consists of adding an alkaline hypochlorite to an iodide in the presence of acetone and claims that by using these same reagents very small quantities of iodine can be detected either directly or by means of the microscope. In the case of an iodide, the solution, if it is not a base of potassa or of soda, is precipitated by neutral sodium carbonate and filtered; to several cc. of the filtered liquid is added one drop of solution of caustic soda or sufficient to render it slightly alkaline;

then 5 or 6 drops of a 10 per cent. aqueous solution of acetone and followed by an alkaline hypochlorite, such as the commercial solution of chlorinated potassa, added drop by drop. If an iodide is present, even in very slight proportion, a whitish cloudiness is observed which soon concentrates to clear yellow granulations of iodoform. If the result is to be confirmed microscopically, a portion of the deposit is placed on a glass slide together with one or two drops of the liquid or else of water, covered with a thin glass and carefully heated to near the boiling point of the liquid. Upon cooling, the miscroscope will reveal the hexagonal prisms and derivative forms of iodoform. In the case of iodate, this is first reduced to the state of an iodide, by the addition of a drop of sodium bisulphite at 40° B., before applying the process.—*Jour. de Pharm. et de Chim.*, December, 1893, p. 499.

Diiodoform has been reported upon by Maquenne and Taine to the November meeting of the Société de Thérapeutique. They regard it as a definite carbon iodide, having the formula C_2I_4 and being almost entirely destitute of odor, so long as it is protected from the influence of light. It is entirely insoluble in water and but slightly soluble in alcohol or ether; the best solvents are chloroform, sulphide of carbon, benzine and especially hot toluol, from which it crystallizes in beautiful yellow prismatic needles, differing entirely from the hexagonal prisms of iodoform. In the pure state it fuses at 192°, emitting abundant vapors; by brisk heating it is decomposed into carbon and iodine. Diiodoform is obtained by treating acetylene periodide by iodine in excess. It is also formed by the action of aqueous potassa and iodine on barium carbide, held in suspension in benzine or chloroform.—*Jour. de Pharm. et de Chim.*, December, 1893, p. 525.

A process for the estimation of iodine in syrup of iodide of iron has been formulated by Gioachino Griggi, based upon the following reaction between potassium chlorate and protoiodide of iron:

$$2FeI_2 + KClO_3 = Fe_2O_3 + KCl + I_4.$$

8 gm. of the syrup are placed into a test tube, and 2 cc. of a 5 per cent. solution of potassium chlorate in distilled water added. After heating the mixture until it assumes an ocherous red color, and allowing it to cool, 5 cc. of pure chloroform are added, the tube is closed, cautiously agitated and then allowed to rest. The iodine

set at liberty, is taken up by the layer of chloroform, and imparts to it a beautiful amethyst-violet color. The chloroformic solution is decanted, added to sufficient distilled water, and the iodine is estimated by normal solution of sodium hyposulphite.—*Boll. chim., pharm*, through *L'Union pharm.*, October, 1893, p. 445.

Commercial examples of yeast were examined by M. Maljean, the results of which are shown by the following table:

Number of samples.	Water.	Ash.	Phosphoric acid.	Starch.	Sodium chloride.	Per cent. of acidity of fresh yeast.	Remarks.
1, ...	60·75	4·75	1·10	12	trace	0·40	These yeasts of nine different manufacturers produced bread whose weight varied from 250 to 350 gm. The acidity was determined with fresh yeast in presence of alcohols (Balland's process).
2, ...	64·65	5·70	1·30	8	—	0·38	
3, ...	59·	3·80	0·85	8	—	0·38	
4, ...	58·25	3·80	0·90	8	—	0·50	
5 { Pure yeast, }	73·25	7·75	1·85	0	—	0·69	
6, ...	72·25	7·50	1·90	0	—	0·74	
7, ...	62·	5·40	1·30	9	—	0·42	
8, ...	61·70	5·40	1·29	9	—	0·41	
9, ...	60·80	5·50	1·30	10	—	0·39	

After drying, pure yeasts have an agreeable odor, recalling that of hot bread; they form thin scales, adhering to the vessel in which they were placed, and acquire a slightly dark brown color. Yeasts mixed with starch have, upon drying, a strong disagreeable odor; they form small masses more or less agglomerated and spotted with white, which is in proportion to the starchy matter they contain.—*Jour. de Pharm. et de Chim.*, Oct., 1893, p. 353.

A study of the physiological action of digitalis species was undertaken by Goldenberg (thesis, Yourieff, 1893), as a result of which he concludes that all species of digitalis exert the same action on the heart of a frog as the infusion of *digitalis purpurea;* but differ considerably in the energy of their action. While *digitalis eriostachys* and *digitalis glandulosa* are only slightly active, and the action of *digitalis Fontanesii* is extremely feeble, *digitalis nervosa* is 1·5 times, and *digitalis ferruginea* even 10 times more active than *digitalis purpurea.* The various parts of the plants contain the active principles in varying quantities, the seeds being richest in active con-

stituents; then follow the leaves, the membranes of the seeds and lastly the stems. In the latter a substance predominates (digitalresin or toxiresin), whose action commences by exciting the nerve-centres, and ends by paralyzing the muscles.—*Vratch;* through *Nouv.* remèdes, November, 1893, p. 509.

The action of sodium phosphate in presence of alkaloids has been studied by M. Christiaens, who concludes that in order to avoid the precipitation of alkaloids in this combination, it is necessary to neutralize by the addition of phosphoric acid to the preparation, by which the precipitates are completely redissolved. The author states the general rule, that all salts, whose reaction with litmus is *alkaline,* precipitate alkaloids from their salts.—*L'Union pharm.,* November, 1893, p. 521.

In preparing camphorated salol in the crystalline state, M. Barnouvin found that a mixture of 3 p. salol to 2 of camphor showed the first formation of crystals only after several days, and that as the proportion of camphor is diminished the crystallization is more rapid, a mixture of 9 gm. salol and 1 gm. camphor crystallizing after a quarter of an hour. The process of preparation consists of fusing the two pulverized substances in a porcelain mortar at a gentle heat, and allowing them to crystallize; it is advisable to place the crystals on filter-paper from time to time; the crystals thus obtained are dry, white and brilliant, possessing the combined odor of salol and camphor. In pulverizing them a powder is produced which is soft to the touch, less unctuous and less white than salol in powder.—*Jour. de Pharm. et de Chim.,* 1893, p. 363.

To distinguish catechu from gambier or pale catechu, M. Gibson has recourse to a microscopical examination for the anatomical structures of the two drugs, gambier being prepared from the young twigs of *Uncaria gambir* bearing the leaves and flowers, while catechu is obtained from the central portion of the trunk of *Acacia catechu.* He dissolves the drug either in an alkali or in 30 per cent. acetic acid, and then examines the insoluble residue.—*Jour. de connais. méd.; Répertoire de Pharm.,* Dec, 1893, p. 533.

To employ sodium phosphate as a purgative, Constantin Paul has devised the following formula, which was reported to the November meeting of the *Société de Thérapeutique*: Distilled water, 200 gm.; sodium phosphate, 25 gm.; simple syrup, 60 gm.; and tincture of lemon, 20 drops. In order to gasify the preparation, 2 gm. each of

citric acid and sodium bicarbonate may be added.—*Jour. de Pharm. et de Chim*, December, 1893, p. 527.

Malacine is a salicylic derivative of phenacetine, has the form of small pale yellow crystals, insoluble in water, but soluble in hot alcohol; the mineral acids, even in feeble solution, decompose it into salicylic aldehyde and phenacetine. Dr. A. Jaquet, who studied its therapeutic action, considers it an antirheumatic which is usually well borne and produces no untoward effects.—*Semaine Médicale;* Nouv. remèdes, October, 1893, p. 465.

Galloparatoluide was obtained by M. Cazeneuve in the form of small crystalline plates, fusing at 211°, slightly soluble in cold water, but very soluble in boiling water, alcohol and ether. Hydrochloric acid decomposes it into gallic acid and paratoluidine; protected from the air, the caustic alkalies do not attack it even at the boiling point, but in contact with air they gradually transform it by oxidation.—*Compt. rend. de l'Académie des Sciences*, Nov., 1893.

Administration of castor oil.—M. Patein advises the administration of castor oil in an emulsion of the following formula: Castor oil, 30 gm.; syrup of almond, 30 gm.; syrup of acacia, 30 gm.; peppermint, 10 gm.; distilled water, 50 gm. To the mixture of the two syrups, the oil is added, then the two distilled waters, mixing intimately after each addition.—*Petit Monit. de la Pharm.*, Oct., 1893, p. 1353.

THE LETTER OF THE LAW—SEQUEL OF A CELEBRATED CASE.[1]

Rarely is such a measure of interest accorded a legal process by the pharmaceutical and medical world as was aroused some two and a half years ago by the famous Nux Vomica suits in the Atlantic Court of Common Pleas, New Jersey. A brief review of those proceedings and of the curious solution which time has recently effected in the legal complications, will not be devoid of profit.

The plaintiff in both these cases was George W. McGuire, State Dairy Commissioner for New Jersey, and criminal action was brought by him against the two defendants,[2] on the charge that

[1] Reprinted from the Bulletin of Pharmacy, January, 1894.

[2] The defendants were Harry B. Leeds, and Albert D. Cuskaden, druggists, and the expenses of the defence were borne by Parke, Davis & Co.

each had sold a quantity of tincture of nux vomica which upon examination was found to contain less than two per cent. of dry extractive. The basis of the prosecution was an existing New Jersey statute, which enacted that any preparation shall be deemed to be adultered if (when sold under or by a name recognized in the U. S. Pharmacopœia) it "differs from the standard of strength, quality, or purity laid down therein." And 2 per cent. extractive, as stated, was the standard of the U. S. P. at that time.

The evidence introduced developed the fact that the tincture had been prepared from normal liquid nux vomica, Parke, Davis & Co.; the plaintiff's witness testified that it contained 0·712 per cent. of dry extractive; and upon this the prosecution rested its charge of adulteration within the meaning of the statute, no attempt being made to establish the therapeutic inferiority of the disputed preparation, or any deficiency in the needful content of the all-important alkaloids.

Seldom has such an array of learned talent or such a wealth of distinguished evidence been brought forward in defence of any cause involving a pharmaceutical question, as was now adduced by the respective defendants in sustaining their position. Professors Remington, Hare, Rusby, Ryan, Marshall, Dr. Eccles, and the lamented Professor Bedford, all went upon the stand and declared with one voice that the active constituents of nux vomica are its two alkaloids, strychnine and brucine, alone; that the quantity of dry extractive forms no standard of strength, quality, or purity, and may, indeed be completely inert—without medicinal property or physiological action; that tinctures of nux vomica made, as was the one in question, from the normal liquid, are far more reliable than the tinctures on the market produced in exact accordance with the U. S. P. formula, since the former are of uniform alkaloidal strength, and the latter subject to extreme variations of medicinal potency; that the U. S. P. standard could be easily evaded by the addition of sufficient glucose to any inferior tincture; and finally, that the Pharmacopœia of 1880 really offered no means of determining the "strength, quality, or purity" of the tincture to which the name standard could with any propriety be applied, hence was virtually devoid of such standard.

All for naught. Here the gods themselves would have contended in vain. Conceding the entire probity of the defendants, and the

full medicinal value of their tinctures prepared from the normal liquid of nux vomica, Judge Reed, nevertheless, decided in the first case that such tinctures were adulterations within the meaning of the New Jersey statute, since the requirement of 2 per cent. dry extractive was not fulfilled! In the second case, some misgivings must have begun to assail the judicial intellect, since the case still hangs suspended in the limbo of the undecided.

But if the Judge showed an undue tenacity in clinging to an obsolete standard, and a disposition to apply the narrow letter of the law, our Pharmacopœia Commission have taken a very different view of the question. In the revised edition (1890) we are happy to observe a radical change in the requirement made of tincture nux vomica: it is no longer 2 per cent. of extractive, but rather 0·3 per cent. of total alkaloids—the identical alkaloidal content which the manufacturers of the normal liquid had long adopted as their own standard for the tincture. The new Pharmacopœia became a part of the New Jersey law on Jan. 1, 1894, thus depriving the cases of all legal basis.

While we may now smile at the emphatic way in which time has rejected the decision of the New Jersey Court, it is obvious that its very absurdity from a medical and pharmacal point of view was not without a compensating benefit in promoting the adoption of a rational standard for this and a few other important preparations in the new Pharmacopœia. Inasmuch as five of the witnesses for the defendants were likewise members of the Revision Committee, the agitation imparted to the question of standardization by the nux vomica cases were unquestionably an active agent in the pharmacopœial changes thus far introduced—changes which, it is to be hoped, will be multiplied until every potent official remedy shall be provided with a standard which will guarantee a uniform medicinal action.

The introducers of normal liquids may well feel content with the handsome vindication which their enterprise has received at the hands of the Pharmacopœia Commission, and with the high compliment embodied in the recent adoption of their well known standard for the official tincture.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, January 16, 1894.

On motion of Professor Trimble, Dr. C. B. Lowe was called to the chair. There were no donations to the library; a number of samples of sugar of milk, from the American Lactose Company, whose works are situated at Plainfield, N. J., were shown. The samples are numbered from one to eight, evidently being the whey in different stages of preparation: the first concentrations, the first purification and decolorization; crystallization to the finest crystals and powder. Two samples of trade packages in tin cans were also among the exhibit. A paper upon the manufacture by Mr. W. B. Thompson appears on page 78, of this number.

Dr. H. M. Alexander, of Marietta, Pa., read a most instructive and interesting paper upon Vaccine Virus, and the methods of obtaining it from the animal as now practised in the best regulated establishments devoted to that industry.

It is too late to discuss the question of the propriety of vaccination; that safeguard has become too well-established and acknowleged among educated professionals and laymen to admit of a doubt. The objections to humanized virus and that from filthy or diseased cattle are recognized and avoided by the precautions adopted by the systematic and carefully arranged vaccine establishments.

The source of true cow-pox has been definitely traced to Beaugency, in France, and it was from this the late Dr. Henry A. Martin obtained the virus which was propagated from heifer to heifer in this country in 1870.

At first a great deal of virus was obtained from cattle utterly unfit for such uses, and kept in stables reeking with filth; it is to avoid such sources of infection proper virus farms were arranged, and every caution that care and good judgment could suggest have been taken to obtain reliable material for vaccination.

The location of a vaccine farm is of the first importance as, without the advantages of fresh air and perfect cleanliness this can hardly be hoped for, and then only in open country where every sanitary condition is easily maintained. The buildings should be built especially for the purpose and light and ventilation must be carefully attended to, and an abundance of pure filtered water must be had at all times.

The selection of animals is of great importance, young heifers between one and two years old are preferable, and rented from farmers who have raised them for dairy purposes; this enables the proprietor of a vaccine farm to trace the strain of the stock and learn of any defects that might exist in the animals. When the animals are found to be suitable subjects they are stabled, groomed carefully, and fed on bran mashes, until fit for operating. The animals are then fastened to a cushioned table and turned over easily in a position in which they rest comfortably, and the inner portion of the flanks back and above the udder are shaven and then innoculated with virus taken from a former case. After they have been treated they are kept in stalls specially arranged, and watched for seven days and nights. When the operation has proven successful the crusts are removed with the handle of a scalpel, the vesicles cleansed by sponging and all impurities removed.

When the lymph is exuding, the points, previously sterilized, are secured in

clamps capable of holding fifty of them, and are coated twice with the lymph from two animals by means of a camel's-hair pencil, so that the operator does not touch them at all. When the points have been thus twice coated they are carefully inspected, packed in glass containers and labelled. Dampness with a temperature above 100° F. is sure to injure the virus; good vaccine points can generally be relied on for sixty or ninety days; and it has been sent to Palestine, Hindoostan and China, where it was used successfully.

The method of vaccination is a matter of importance and upon its proper performance the result will almost always determine successfully. The best plan is to scrape off the scarf-skin and scratch the abraded surface in two directions when the serum is just apparent. The point barely moistened on one side is applied, and the pasty virus is applied to the absorbents and the operation is completed.

The whole subject so far as it is needful for intelligent persons to understand the methods and care necessary to deal in good articles of the kind, has been fully explained and is most gladly submitted to your consideration.

As Mr. Crawford was unable to be present to-day to continue this interesting paper upon the forestry of the Columbian Exposition, Mr. H. C. Barker read a paper, Pycnanthemum lanceolatum, or mountain mint. See p. 65, of present number of the journal.

A couple of boxes each containing about a quarter of a pound of Keifun, or Japanese Calomel, was exhibited by Professor Trimble, who received it from Chicago, through the efforts of Mr. Joseph Crawford, where it was on exhibition among the Japanese manufactures of the Columbian Exposition. Its appearance is different from the Calomel as obtained by the processes adopted in the more Western countries, those of Europe and America. It is in fine scales and much lighter than Calomel obtained by the officinal processes of Continental or American Pharmacopœias. It is prepared in a very simple manner from mercury salt and an earth found in the neighborhood of the Village of Isawa, Japan. It has been made for about 300 years by members of the family of the present maker, whose works employ about ten persons, and the output is about 15,000 pounds annually. The maker is Heirjiro Kokubu. It sells for $1.40 per pound, silver.

A vote of thanks was given to Dr. Alexander for the interesting and instructive lecture, and also to Mr. Barker for the paper read, both of which were referred to the committee on publication.

There being no further business, a motion to adjourn was put and carried.

T. S. WIEGAND, *Registrar.*

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Belladonna, A Study of its History, Action and Uses. Edited by F. B. Kilmer. New York: Johnson & Johnson. 1894.

A short monograph, containing contributions, translations and abstracts from the following; Henry Kraemer, Ph.G., Chas. Rice, Ph.D., Prof. E. S. Bastin, J. M. Maisch, Ph.M., Prof. C. V. Riley, Prof. J. Bernard Smith, Prof. J. P. Remington, Ph.M., Dr. E. E. Eccles, Prof. J. U. Lloyd, Prof. H. C. Wood, Dr. A. R. L. Dohme, Prof. J. B. Smith and others. It is a small pamphlet of 72 pages, profusely illustrated, treating of the history, botany, pharmacognosy, pharmacy,

pharmacology and therapeutics of belladonna. The last forty pages of the pamphlet are taken up by a treatise on the local action of belladonna when applied as a plaster.

A Dictionary of Medical Science, containing a full explanation of the various subjects and terms of anatomy, physiology, medical chemistry, pharmacy, pharmacology, therapeutics, medicine, hygiene, dietetics, pathology, surgery, bacteriology, ophthalmology, otology, laryngology, dermatology, gynecology, etc. By Robley Dunglison, M.D , LL.D., late Professor of Institutes of Medicine in Jefferson Medical College of Philadelphia. Edited by Richard J. Dunglison, A.M., M.D. Philadelphia: Lea Brothers & Co. 1893.

This work, of which we have the twenty-first edition before us, hardly needs any words of recommendation from our hands, as the value of the same is well indicated by the number of editions it has gone through. According to the publishers' announcement forty-four thousand new words and phrases have been added, and although everything obsolete has been omitted, the work still contains over 100 pages more than its predecessor. The pages have been enlarged, and although everthing obsolete has been omitted, the work still contains 1,181 pages. Among the additions we find the pronunciation of the words indicated, and also the derivation thoroughly given, which alone makes the dictionary of great value to the student. Besides this the explanatory definitions have been enlarged, from which much valuable information may be obtained. The work is gotten up in excellent shape, and shows thorough revision and improvement throughout.

Contributions from the Botanical Laboratory of the University of Pennsylvania. No. 2. Pp. 202 and 4 plates.

The second number of this serial is devoted to one contribution on "Maize: A Botanical and Economic Study." By John W. Harshberger, Ph.D.

This interesting monograph traces, through various channels, the origin of the cultivation of maize to have been with the Maya tribes of Mexico, at a period not far from that of the Christian era. The author clearly disproves the theory that it was of Asiatic origin. A chapter on the chemistry of the plant, and considerable bibliography on the subject, add to the value and interest of the work. The whole contribution is worthy of imitation by other American investigators.

Anatomischer Atlas der Pharmacognosie und Nahrungsmittelkunde. Von Dr. A. Tschirch und Dr. O. Oesterle, Leipzig. T. O. Heigel, Nachfolger. 1893.

Anatomical Atlas of Pharmacognosy and of Foods and their Adulterations.

The first part before us contains angelica root, German chamomile, tea, capsicum and mustard. Each drug is fully described as regards its anatomical structure, and to make the work more precise, each description is accompanied by a plate showing the different sections and elements of structure. The descriptions are clear and the plates well executed. The work is of such a character that it will become a standard work of reference and can well be placed alongside of the Berg'sche Atlas.

The Student's Dictionary of Medicine and the Allied Sciences. Comprising the pronunciation, derivation and full explanation of medical terms, together with much collateral descriptive matter, numerous tables, etc. By Alexander Duane, M.D., assistant surgeon to the New York Ophthalmic and Aural Insti-

tute; Reviser of Medical Terms for Webster's International Dictionary. Philadelphia: Lea Bros. & Co. 1893.

This dictionary, although not as voluminous as Dunglison's Dictionary, is still as full as a student would desire. The tables contain much interesting and useful information. Especially is that the case with the table on Bacteria and Fungi, which is arranged in five columns, the name, origin, morphological characters, temperatures at which it flourishes in degrees Centigrade, and properties. The article takes up thirty-four pages, most of it being taken up by the table. Other tables are those on the arteries, canals and foramina, exanthemata, joints, muscle (21 pages), nerves (6 pages), poisons and antidotes and rales and other adventitious respiratory sounds. The explanatory descriptions are short and clear, and on the whole the work ranks well with the Dunglison's Dictionary, published by the same house. The paper, typography and binding are excellent. The work consists of 650 pages.

The following reports of pharmaceutical associations have been received:

American Pharmaceutical Association. Forty-first annual meeting; Chicago, August 14 to 21, 1893.

This the first part of the proceedings containing the minutes, reports, papers and discussions of the meeting.

Minnesota.—Ninth annual meeting; Hotel St. Louis, Lake Minnetonka; June 13 and 14, 1893.

New York State.—Fifteenth annual meeting; Lakewood, N. Y., June 27, 28 and 29, 1893; containing as a frontispiece a well-executed portrait of Prof. P. W. Bedford.

The following pamphlets have been received:

A Pathology and Treatment of Nervous Catarrh. By Seth Scott Bishop, M.D., of Chicago.

Reprint from the Journal of the American Medical Association.

Report on Nasal Surgery. By M. T. Coomes, A.M., M.D., of Louisville, Ky. Reprinted from American Practitioner and News.

Formalin, Diabetin, Rubidium Iodide, Creosote Carbonate. Schering.

Four phamplets giving description and uses of the various medicaments.

Central Experimental Farm, Ottawa, Canada. Bulletin, No. 19. Containing Grasses: their uses and composition. Published by direction of the Hon. A. R. Angers, Minister of Agriculture.

OBITUARY.

Dr. Frank P. Sher, Ph.G., Class 1875, died at his late residence, 1002 Snyder Avenue, Philadelphia, Pa., November 14, 1893, aged 38 years and 9 months, of acute pneumonia. He learned the drug business with J. W. Dallam & Co., at Second and Callowhill Streets, and graduated from the Philadelphia College of Pharmacy in 1875. Afterwards he attended the Jefferson Medical College, and graduated in medicine. For some years he conducted a drug-store, at 1813 South Sixth Street, in connection with the practice of medicine. About four years ago he relinquished the drug business and removed to 1002 Snyder Avenue, where he devoted his entire time to the practice of medicine. He was well known in the lower section of the city, and had an extensive practice, and was highly esteemed by all who knew him. He was connected with several political, social and fraternal organizations.